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ABSTRACT

Historically, nontest variables have been used more frequently than achievement test scores in the prediction of educational progress, but research in this area has been largely empirical. Recently, however, a theoretical model based on the premise that past behavior is the best predictor of future behavior was formulated. This model was used in a longitudinal study with a sample of 1037 males and 897 females at a southeastern university. Nontest variables were 389 biographical items drawn from a pool of over 2000 items and assembled into a questionnaire. Subgroups were formed on the basis of scores on biographical factors, thus clustering similar profiles, rather than on the item responses. A cross validation study was carried out with a 118-item biographical questionnaire. Two types of educational criteria were used: (1) grade point average and (2) number in a subgroup who were in an arts-science curriculum, number with one or more dean's list, number with one or more probation or dismissal, or number of dropouts. Relationships between these criteria and subgroup membership were univariately and multivariately analyzed. Subgroup structure was stable over a two-year period. The relationship between group membership and selected educational criteria was confirmed, showing that knowledge of a person's past behavior can permit meaningful prediction of educational progress. The female and male biographical factors, subgroup differences on biographical factors and selected criteria and group means are included. (CK)

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NONTEST VARIABLES IN THE PREDICTION OF EDUCATIONAL PROGRESS[1]

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From a historical perspective, nontest variables have been employed more frequently than test variables in the prediction of educational progress. In fact, the wholesale application of achievement tests to predict academic progress has been post WWII phenomenon.

Even as test scores have become almost universal components of the academic prediction equation, research with nontest variables has continued. Much of this research has been empirical in nature, as exemplified by one commercial venture, the Alpha Biographical Inventory (Institute for Behavioral Research in Creativity, 1968), an instrument with 300 items which provide about 1350 scorable alternatives. Although research details are not available, the scales for predicting academic achievement were developed by correlating each alternative with the criterion. The results were correlations between the biographical scale and GPA one semester after matriculation of .58 and .60 for males and females respectively (approximately 35% of the variance explained), about equal to the results obtained using measures of academic achievement (high school GPA plus SATs), or biographical data and achievement measures combined (Klein, Rock, & Evans, 1968).

The point is a simple one, and has been known for a number of years;

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the empirical approach works. This is not to say that there have not been criticism of this procedure, there have been, (Lovinger, 1967), the most serious of which is that it is not science.

For the past 15 years efforts to successfully find an alternative approach to prediction have concentrated on use of moderator variables. Variously termed prediction of predictability (Frederiksen & Melville, 1954; Ghiselli, 1956, 1960a, 1960b), intra-individual variability (Fisk, 1957; Fisk & Rice, 1955), interactions (Lee, 1961), individual differences regression (Cleary, 1966), and moderated stepwise regression (Rock, 1969), the dominant theme has been the identification of Ss who are predictable with a given set of predictors or group of Ss requiring different prediction procedure. These research efforts have demonstrated that moderators do contribute to differential validity, but are about as elusive as supressors as far as holding up after cross-validation.

More recently Owens (1968) described a theoretical model based on the premise that past behavior is the best predictor of future behavior. This model provided that prediction would be accomplished by forming subgroups with respect to the major dimensions of antecedent behavior, and relating the subgroups to criteria of interest. Furthur, biographical data was suggested as the vehicle for meaningfully measuring the important antecedent characteristics that contribute to individual differences (Owens, 1968: Owens & Henry, 1966).

The purpose of the present research is to describe results obtained to date using the model suggested by Owens. The application of model was a longitudinal study involving several educational criteria.

Procedure

Subjects. Two samples of Ss were involved. The longitudinal sample consisted of 1037 males and 897 females, an 80% sample of the 1968 freshman class at a southeastern university. All Ss completed a Biographical Information Blank and a battery of tests.

The cross-validation sample consisted of 2,155 persons, an 83% sample of students who matriculated fall 1970 at the same university. Ss in the cross-validation sample completed a short form of the biographical questionnaire while on campus for freshman orientation during the summer of 1970.

Biographical data. The nontest variables were 389 biographical items assembled into a questionnaire from a pool of over 2,000 items. The item screening, a several year procedure, has been described by Bryson (1969). All items were multiple choice, with the responses arranged to form a continuum.

The subgroups were formed on the basis of Ss scores on biographical factors rather than on the item responses. Separate principal components analyses for the females and males, followed by Varimax rotations, resulted in 15 and 13 interpreted factors, respectively (Schoenfeldt, 1970). These factors are described in Tables 1 (females) and 2 (males). Thus the data matrix consisted of 15 uncorrelated factor scores for each female and 13 for each male.

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Insert Tables 1 & 2 about here

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Clustering similar profiles. The problem of forming subgroups was divided into three segments, each of which has been described in detail previously (Schoenfeldt, 1970). The main clustering procedure was based on the hierarchical grouping technique developed by Ward (1963; Ward & Hook, 1963), an iterative procedure which makes no assumptions as to the number of groups in the sample.

Because of computer limitations it was necessary to divide each sex group into smaller samples, identify clusters in the separate samples, and match across samples. This was accomplished by combining the groups identified from the separate samples that were essentially colinear in the discriminant space of the biographical data.

One deficiency in the grouping procedure has been that once assigned to a group, the individual remains in that group. Thus the assignment of individuals to subsets is usually less than optimal at the conclusion of the grouping (Ward, 1963). A two part procedure was developed to evaluate the fit of each individual to the assigned group and remove him from the structure if he failed to fit any group well (isolate), or fit more than one group about equally (overlap).

Cross-validation. The Ss in the cross-validation sample completed a 118 item biographical questionnaire. This short form consisted of the items with the highest loadings on the factors previously described. The multiple correlations and cross-validies, calculated by the procedure suggested by Claudy (1969), obtained using the 118 items to predict the factor scores for the 1968 Ss are presented in the right columns of Tables 1 and 2.

Using the estimated factor scores computed from the 118 item form,

the Ss tested in 1970 were classified to the groups. The classification was done by locating each S tested in 1970 in the space determined by discriminating the 1968 groups on the biographical factor scores. The S was then placed in the group he most resembled, assuming that the 1968 groups were of equal size (Cooley & Lohnes, 1962). As was done when the groups were formed, overlaps and isolates were not assigned to a group.

Educational criteria. Two types of criteria data were used. The first, available for the Ss in the 1968 study, consisted of the following measures obtained for each group in Fall, 1969, 12 months after matriculation: (a) number in an arts-science curriculum (versus professional, such as education, business, journalism, etc.), (b) number with one or more dean's list, (c) number with one or more probation or dismissal, and (d) number of dropouts, i.e., number that failed to register in Fall 1969. These measures were used to evaluate the grouping procedure interms of its ability to produce groups that differ on educational criteria.

Since the above mentioned measures were not available for the Ss entering in Fall 1970, a second criterion, predicted grade point average (GPA) was obtained for both the validation and cross-validation samples. This measure, as well as the high school GPA, SAT math , and SAT verbal from which it was computed, were available from the admissions office.

Analyses. Relationships between subgroups membership and educational criteria were analyzed both univariately and multivariately. The univariate analysis consisted of computing chi-squares comparing the nominal group categories with the several dichotomous criteria. Replication was examined by comparing the rank order of groups evolved in 1968 on predicted GPA with

the rank of the 1970 groups on this same variable.

Two canonical discriminant analyses, one for each sex, were computed using the three variables which comprise the predicted GPA score to maximally differentiate the groups formed using the Ss tested in 1968. The extent to which the 1970 groups were colinear with the 1968 groups in the discriminant space was taken as the degree to which the subgroup structure was generalizable with respect to predicted GPA.

Results

The Groups. Using the procedure described, 15 female and 23 male subgroups were formed. Approximately 75% of the total sample was allocated to one of the groups with the remaining Ss either not fitting any of the groups or, alternately, matching two or more groups.

As might be expected differences between the groups on the biographical factors were highly significant, thus allowing the characterization of each group in terms of the biographical dimensions that distinguish it from all or most of the remaining groups. Specifically, Newman-Keuls multiple range tests were computed comparing the groups on each factor. The results are presented in Tables 3 (females) and 4 (males).

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Insert Tables 3 and 4 about here

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Sixty-five percent of the females and 63% of the males tested in 1970 could be clearly classified to one and only one of the groups evolved using the 1968 Ss. As can be seen from Table 5, male groups 3 and 9 had fewer Ss classified to them in 1970 than would have been expected on the basis of the group Ns in 1968, whereas groups 8 and 22 had more Ss. For

the females, groups 2, 10, and 15 had fewer Ss while groups 9 and 11 had more than expected.

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Insert Table 5 about here
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Group differences on the educational criteria. For the females (Table 3), there was a significant relationship between group membership and the dichotomized criteria of arts-science (χ^2 = 33.3, p <.01), dean's list (χ^2 = 39.9, p <.001), and probations (χ^2 = 51.2, p<.001). The relationship betweem group membership and enrollment in the Fall of 1969 (dropout); was not significant at the .05 level (χ^2 = 22.5, p<.10), and is not included on Table 3. All four criteria were significant for the males (Table 4), arts-science (χ^2 = 37.1, p<.05), dean's list (χ^2 = 103.8, p<.001), probations (χ^2 = 80.1, p<.001, and dropout (χ^2 = 42.3, p<.01).

Cross-validation. Table 5 contains the group means on predicted GPA for the 1968 Ss, from which the groups were formed, and 1970 Ss classified to the groups. The range in group means decreased slightly, going from 1.14 for the males in 1968 to 1.06 in 1970 and .78 to .66 for the females.

For both sexes at both time periods the F ratios resulting from single factor ANOVs were highly significant, a necessary but insufficient condition for meaningful prediction. More importantly, the rank order correlation between group means on predicted GPA in 1968 and 1970 was .89 (p <.001) for the males and .73 (p < .01) for the females, indicating that the group structure was generalizable across the two year period.

The known 1968 groups and variables of high school GPA, SAT-verbal and SAT- math make discriminant analysis possible. Two analyses were run,

one for each sex, using the three variables to maximally differentiate the 21 male (Groups 3 and 6 were deleted since they did not replicate) and 14 female groups (Group 10 was deleted). The canonical procedure examines the interrelations between two sets of measurements made on the same Ss, the test scores and roster of group codes. Each discriminant function is a linear composite of the tests that correlates maximally with a linear of the groups codes, given that each linear combination is uncorrelated with any previously computed (Cooley & Lohnes, 1962).

For both sexes, two of a possible three functions were significant (see Table 6). These functions accounted for 78% of the discriminating variance in the battery for the males and 73% for the females. As can be seen in Table 6, for each sex the first function was high school GPA and the second SAT. The dots on Figures 1 (females) and 2 (males) indicate the centroids of the 1968 groups in the respective two dimensional spaces. The small squares indicate the location in the discriminant space of the Ss classified to each group from the 1970 sample. For the females, all but one of the 1970 groups was in the same quadrant as the 1968 counterpart. Group 5 was below the origin on the high school GPA dimension in 1968 and above in 1970. Four of the 21 male groups formed in 1970, Groups 5, 8, 9, and 11, were in different quadrants from the the corresponding 1968 groups.

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Insert Table 6 about here

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Discussion

It was possible to form homogeneous groups well differentiates on the life history factors, and to characterize these groups in terms of the

factors. Ss administered a shortened version of the biographical questionnaire were classified to the groups formed on the basis of data collected two years earlier.

Four of the 1968 subgroups had few or none of the Ss tested in 1970 classified to them. One of the four, male group 6, contained only two percent of the classified Ss in 1968, so the decrease could easily be the result of fewer Ss in 1970. Preliminary indications are that the other three groups (male groups 3 and 9, female group 10) were different types of response bias. Groups 3 and 9 (male) were the only groups with distinctly high means on the fifth factor, Pseudointellectualism (see Table 4).

The relationship between group membership and selected educational criteria was confirmed, thus showing that knowledge of a person's past behavior can allow for meaningful prediction of educational progress. This was true for both sexes.

Knowledge of previous research in the area of progress through the educational system leads to certain expectations with regard to patterns of behavior. For example, at the institution involved Arts and Sciences is the tougher curriculum and tends to attract better students, who inturn are less likely to dropout or go on probation. As can be seen from Tables 3 and 4, this tends to be the case with the exceptions of male groups 20, 22, 23 and female groups 8, 9, 14. In terms of the biographical factors which characterize these groups, there could be as many as six explanations for these deviations from the norm. Realistically there are probably two or three, each of which is a hypothesis for an additional study. For example, some Ss may be miscounceled into Arts and Science because of high Science Interest and despite low Academic

Achievement, as seems to be the case with male group 20. However, another explanation may revolve around a pattern seen for three of the groups, male groups 22, 23 and female group 14. Each is low on the first factor, Parential or Maternal Warmth, and high on the Parential Control factor.

One would think that dean's list and probation-dropout would represent opposite extremes of the academic continuum, yet it is possible to find groups that were below average on both (no groups were above average on both), or groups that went in opposite directions on probations and dropout. The several hypotheses that could be advanced to explain these deviations need to be explored by means of additional research.

The discriminant analysis of the groups formed in 1968 and subsequent location of the 1970 groups in the discriminant space provided a double srinkage cross-validation. Chance factors influencing both the groups interrelationships and idiosyncracies in the 1968 sample were corrected, with the result that the dynamics involved were illustrated in a dramatic way. For example, high SAT does not seem to compensate for low high school GPA, as per male groups 22 and 23. The notable exception is male group 1 which was low on both dimensions yet had fewer dropouts (but more probations) than average. The biographical profile of this group seems to confirm that they are: (a) handicapped academically, (b) serious students (low Athletic Interest), and (c) motivated to continue (high SES).

Conclusions

The results obtained suggest the following conclusions:

(1) The life history subgroups formed were related to selected educational criteria. The strength of this relationship between the subgroups and criteria to be equal to or greater than that obtained by any variables

and/or predictive procedure currently being advocated.

(2) Comprehension of relationships was considerably enhanced, making possible the development of hypotheses for observed patterns of performance on the educational criteria.

(3) The subgroup structure was stable over a two year period. Approximately 65% of the Ss surveyed in 1970 were classified to one of the groups, only slightly less than the percentage of 1968 Ss that fit one and only group.

(4) The intergroup relationships cross validated. This was true for both the univariate and multivariate analyses.

The model suggested by Owens (1968) is suggested as a method of relating nontest variables to educational progress. Subgroups homogeneous with respect to the nontest variables can be compared on the educational criteria with an improvement in comprehension and no apparent loss in predictive efficiency.

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Footnote

[1]In Dudek, E. E. (Chm.) , Use of nontest variables in admission, selection, and classification operations. Symposium presented at the meeting of the American Psychological Association, Miami, September 1970.

Table 1

Description of Female Biographical Factors in Terms of High Scoring Individuals

Factor	% Variance Explained	R[b]	ρ_c[c]
1. Warmth of Maternal Relationship In high school, were very close to the mother; mother more often provided emotional support and interest; more often discussed intimate and/or important matters with mother.	4.3	.94	.92
2. Social Leadership More often tended to guide or direct others in group activities; participated in school politics; held more leadership positions in high school.	3.2	.95	.94
3. Academic Achievement High grades; very high standing in h.s. class; more competitive in academic situations; more often expected to be successful in academic tasks.	3.1	.96	.95
4. Socioeconomic Status High educational and occupational level of father, high family income and social class.	2.6	.96	.95
5. Parental Control vs. Freedom (bipolar) Parents were more strict, and allowed less freedom or independence, and were more punitive by taking away privileges.	2.4	.93	.91
6. Cultural-Literary Interests Regularly read national news magazines; did much more non-required reading; often watched TV news programs and special reports.	2.0	.88	.85
7. Athletic Participation Rated past performance in physical activitiws very high, very active in athletic activities; more often engaged in individual and team sports, enjoyed physical ed. courses.	1.9	.97	.96
8. Scientific-Artistic Interests Enjoyed courses in the sciences, music, or art, more often worked with scientific equipment or apparatus; physical and biological science subjects; active in dramatic, art or music groups	1.8	.92	.90
9. Conformity to Female Role More often suffered "attacks of conscience" when they felt they had done wrong by the standards of society, the church or parents; more often wished to become more socially acceptable, or better prepared as a responsible family member.	1.8	.88	.84
10. Maladjustment Often typically felt downcast and dejected, felt so upset that they brooded over the meaning of life; daydreamed to a greater extent; were more sensitive to criticism.	1.8	.92	.90
11. Expression of Negative Emotions Very often openly expressed anger with a close friend; very often tried to get even when someone close hurt or upset them; more often wanted to "take things out" on friends.	1.7	.87	.84
12. Social Maturity More likely to give help or advice to friends with personal probelms; enjoyed complete freedom to work as they pleased in class projects or tasks; were respected by classmates.	1.6	.86	.82
13. Popularity with the Opposite Sex More often went on dates; started dating regularly and started going steady at younger age.	1.6	.90	.88
14. Positive Academic Attitude Teachers were more successful in arousing academic interests, and allowed much class participation and discussion; liked h.s. teachers to a greater degree; felt h.s. education was adaquate.	1.5	.92	.90
15. Daddy's Girl Were very close to the father, and spent relatively more time with him, father provided emotional support, interest, and gave more attention.	1.3	.92	.90
Total Variance Explained:	32.6		

[a] Listed in descending order of variance explained.
[b] Multiple correlation using 118 biographical items (short form) to predict each factor score.
[c] The unbiased estimate of the cross-validated population correlation, which is the multiple correlation obtained by applying the sample weights to the entire population (Claudy, 1969).

Table 2

Description of Male Biographical Factors in Terms of High Scoring Individuals[a/]

Factor	% Variance Explained	R[b/]	ρ_c[c/]
1. Warmth of Parental Relationship Had a close, warm relationshop with both parents; parents were very likely to give affection, praise and attention; wanted to imitate and be like the father.	3.5	.96	.94
2. Academic Achievement High standing in h.s. class; often on the semester honor roll; very competitive and successful in academic situations.	3.1	.96	.95
3. Social Introversion Compared to others in high school: fewer casual friends, fewer dates, less popular, more self-conscious and ineffective in meeting demands of social situations.	3.1	.95	.94
4. Athletic Interest Very active in athletic activities; often engaged in team sports; enjoyed physical education courses; rated past performance in physical activities very high.	2.3	.97	.96
5. Pseudointellectualism Regularly read literary, business, or scientific magazines; watched educational and cultural TV shows.	2.3	.93	.91
6. Aggressiveness/Independence (Verbal) Enjoyed discussion courses, and tended to try to make others see their point of view; questioned teachers on subject matter a lot; were often regarded as radical or unconventional; often wanted to be alone to pursue own thoughts and interests.	2.2	.94	.93
7. Socioeconomic Status High parental educational level, average family income, and father's occupational is high.	2.1	.96	.95
8. Parental Control vs. Freedom (bipolar) Parents were more strict, critical, or punitive; anger was more often shown by or at parents; were allowed much less freedom or independence.	2.0	.94	.92
9. Positive Adjustment Response Bias Rarely wished to become more socially acceptable; less often chose parents or friends as someone to "take things out" on; less often felt downcast, dejected or self-conscious; not typical to daydream.	1.9	.94	.93
10. Scientific Interest Enjoyed science and lab courses, and found them relatively easy; worked with scientific apparatus and equipment, often outside of any required school assignment.	1.8	.95	.94
11. Positive Academic Attitude Liked school and teachers very much; teachers were more successful in arousing academic interests; enjoyed specific courses more; did more hours of homework.	1.5	.94	.92
12. Religious Activity Very active in church, religious or charitable organizations; compared to others of the same age, more often went to church, and had stronger religious belief.	1.3	.91	.88
13. Sibling Friction More often argued or fought with siblings; had more younger brother and sisters, close to their own age; more friction and feelings of competition.	1.1	.96	.95
Total Variance Explained	28.2		

a/Listed in descending order of variance explained.
b/Multiple correlation using 118 biographical items (short form) to predict each factor score.
c/The unbiased estimate of the cross-validated population correlation, which is the multiple correlation obtained by applying the sample weights to the entire population (Claudy, 1969).

Table 3

Subgroup Differences on Biographical Factors and Selected Criteria -- Females

N	Group	Group Differences on Biographical Data Factors[a] 1 Matern. Warmth	2 Soc. Ldrshp.	3 Acad. Ach.	4 SES	5 Paren. Contr.	6 Cult. Liter. Inter.	7 Athl. Partic.	8 Sci. Artis. Inter.	9 Female Role	10 Mal-Adjust.	11 Neg. Emot.	12 Social Matur.	13 Popul. Oppos. Sex	14 Pos. Acad. Attit.	15 Dad's Girl	Grp. Diff's on Criteria % Arts & Sci. School	% Dean's List	% Proba-tions	Group
73	1	MH*		MH*	ML*			ML*	ML*								39	25	7	1
65	2	H**		ML*			L**					MH*		MH*			Lo-35	Lo- 3	29	2
59	3	ML*		MH*	VL*		ML*	VH*									Lo-35	17	8	3
38	4	MH*	EH***		MH*			H*	ML*						ML**		50	24	16	4
47	5		ML*					ML*	VL*				ML**	L***			52	17	9	5
41	6			L**		MH*				VH***	VH***						44	Lo- 0	Hi-37	6
56	7		L**					MH*	MH*	ML**				VL**			Hi-68	14	23	7
41	8			VL*		ML*	VH**					L*	H*			L**	51	5	24	8
22	9			VH*			H****	MH*	H*	L***		VH***	MH*		L***		57	9	23	9
35	10			VL*	L**		MH*		VH*		L*	H***	L****				49	6	Hi-40	10
42	11	MH*			VH*	ML*		ML*					VH*	ML**	VL***		61	17	14	11
20	12		VL*	H*	VL**			L*	MH*		H****			ML**	H***		Hi-75	Hi-35	Lo- 5	12
70	13			VH*	H***												59	24	13	13
15	14	L****				H****	MH*	ML*	L**				MH*	H**	VH***		64	13	Lo- 0	14
43	15		H***			L*	VL**	MH*		H***							40	14	12	15
															Average %		49%	15%	17%	

[a] H, L = Highest Grp., Lowest Grp. (0.57 to 1.55 s.d.'s above mean, or 0.65 to 2.54 s.d.'s below the mean)
EH, EL= Extremely High, Extremely Low (more than 1 s.d. from mean)
VH, VL= Very High, Very Low (between .75 and 1 s.d. from mean)
MH, ML= Moderately High, Moderately Low (between .5 and .75 s.d. from mean)

**** = Group is significantly different from all other groups.
*** = Group is significantly different from 12 to 13 of the remaining groups.
** = Group is significantly different from 10 to 11 of the remaining groups.
* = Group is significantly different from 7 to 9 of the remaining groups.

Significance determined using the .05 level of the Newman-Keuls test.

Table 4

Subgroup Differences on Biographical Factors and Selected Criteria -- Males

N	Group	Group Differences on Biographical Data Factors[a] 1 Paren. Warmth	2 Acad. Ach.	3 Soc. Introv.	4 Athl. Inter.	5 Intell.	6 Verb. Agress.	7 SES	8 Paren. Contr.	9 Pos. Adjust.	10 Sci. Inter.	11 Acad. Attit.	12 Relig. Activ.	13 Sib. Fric.	Grp. Diff's on Criteria: % Arts & Sci. School	% Dean's List	% Probat-tions	% Drop-outs	Group
44	1				EL**	L*	VL**	VH*							45	5	39	18	1
48	2		EH***	EL**	MH*										69	17	25	Lo- 8	2
73	3					H***	VL**								49	Lo- 1	Lo- 9	25	3
33	4		MH*	VL*	EL*					MH*			L***		55	12	Lo- 9	24	4
31	5									VL*	EH*			EL**	57	13	35	13	5
17	6			L***			EH***			VL*	L*	EH**	H**	VL*	56	12	12	29	6
14	7		VH*	H***	EL**			ML*	L**	EL**					Hi-79	21	Lo- 0	Lo- 7	7
48	8				MH*			VH*				H**			57	4	25	27	8
34	9					EH***			MH**	VL*			VL**		47	3	Hi-59	24	9
29	10	VH*		MH*	MH*						VL*		ML**	VH**	55	7	28	34	10
25	11						H***				ML*	L*		H***	56	8	20	20	11
42	12	ML*			VH*			VL*			VL*		ML**	ML*	45	19	29	31	12
58	13							L**		MH**					Lo-40	3	45	36	13
27	14		MH*		L**						VH**			EL**	Hi-77	15	18	15	14
25	15				H*			EL**			H****			VH*	52	8	28	32	15
24	16	H*		EH**						H****	MH*				67	8	21	17	16
22	17		H****	EH*				H**			ML*				62	Hi-55	Lo- 9	Lo- 9	17
22	18			EH*					MH*	L**					50	5	45	23	18
14	19	EL**	MH*	VH*			EH**	VH*	EH***		VH**	EH**		L**	Hi-93	14	21	21	19
45	20		VL*		MH*						VH**		ML**		67	4	Hi-53	36	20
25	21		VH*	VH*	VH*		L***								64	Hi-40	12	12	21
37	22	L***		ML*					H***						65	3	Hi-54	38	22
24	23	ML*	L***						MH*				VL**	EL**	62	Lo- 0	46	Hi-50	23
													Average %		55%	10%	33%	25%	

[a] H, L = Highest Grp., Lowest Grp. (0.90 to 2.01 s.d.'s above mean, or 0.79 to 1.57 s.d.'s below mean)
EH, EL = Extremely High, Extremely Low (more than 1 s.d. from mean)
VH, VL = Very High, Very Low (betweem .75 and 1 s.d. from mean)
MH, ML - Moderately High, Moderately Low (betweem .5 and .75 s.d. from mean)

**** = Group is significantly different from all other groups.
*** = Group is significantly different from 19 to 21 of the remaining groups.
** = Group is significantly different from 16 to 18 of the remaining groups.
* = Group is significantly different from 12 to 15 of the remaining groups.

Significance determined using the .05 level of the Newman-Keuls test.

Table 5

Group Means on Predicted Grade Point Average; 1968 and 1970

	Males				Females			
	1968 Sample		1970 Sample		1968 Sample		1970 Sample	
Group	N	Predicted GPA	N	Predicted GPA	N	Predicted GPA	N	Predicted GPA
1	44	2.27	37	2.34	73	2.85	71	2.77
2	48	2.81	38	3.02	65	2.24	43	2.34
3	73	2.09	6		59	2.76	43	2.69
4	33	2.43	48	2.62	38	2.50	44	2.58
5	31	2.38	11	2.31	47	2.52	50	2.75
6	17	2.56	3		41	2.23	20	2.71
7	14	3.03	14	2.81	56	2.46	62	2.51
8	48	2.27	68	2.29	41	2.36	61	2.37
9	34	2.09	7	2.37	22	2.70	91	2.91
10	29	2.26	30	2.31	35	2.28	1	
11	25	2.59	33	2.66	42	2.58	82	2.70
12	42	2.45	55	2.56	20	3.01	26	2.94
13	58	2.41	38	2.46	70	2.78	69	3.00
14	27	2.85	18	3.18	15	2.56	15	2.87
15	25	2.40	19	2.48	43	2.59	15	2.74
16	24	2.57	21	2.64				
17	22	3.18	21	3.25				
18	22	2.37	25	2.49				
19	14	2.30	12	2.73				
20	45	2.04	47	2.19				
21	25	2.85	34	2.76				
22	37	2.29	60	2.46				
23	24	2.18	43	2.30				
Total	761		688		667		693	

Table 6

Variate Correlations with the Discriminant Functions

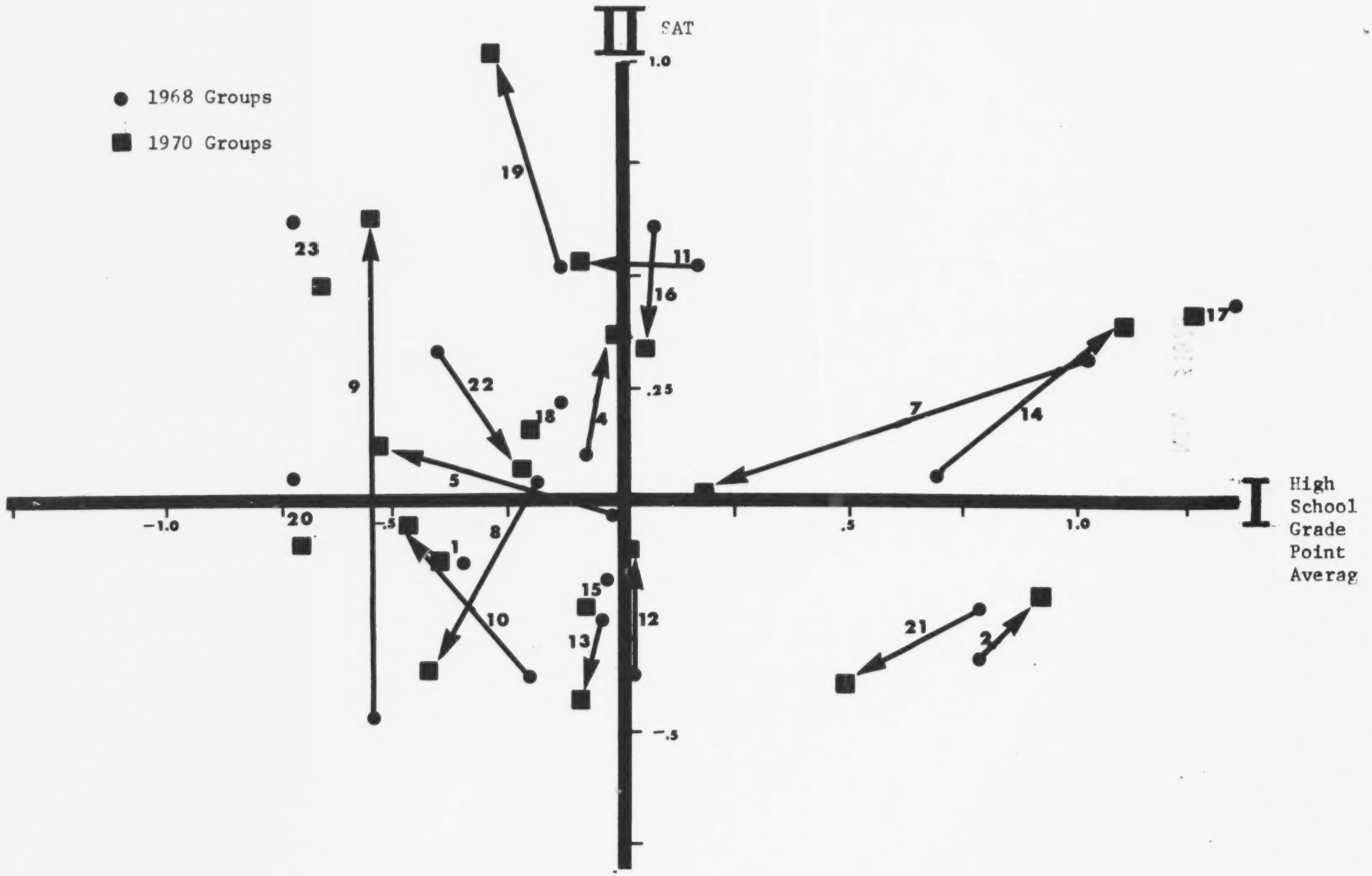
	Correlations with Functions			
	Males		Females	
Variables	I	II	I	II
High School GPA	.98	-.12	1.00	-.04
SAT - Verbal	.36	.88	.26	.96
SAT - Math	.32	.61	.26	.34
Canonical r	.51	.32	.46	.38
Probability	.000	.000	.000	.000
% Variance	40%	38%	38%	35%

Figure Captions

Figure 1 Female group centroids in the predicted GPA discriminant space.

Figure 2 Male group centroids in the predicted GPA discriminant space.

SAT
1.0
.5
-.5
-.75
-1.0
-.5
.5
1.0
High School Grade Point Average
1968 Groups
1970 Groups
1
2
3
4
5
6
7
8
9
11
12
13
14
15


1968 Groups
1970 Groups
SAT
1.0
.25
-.5
-1.0
-.5
.5
1.0
High School Grade Point Averag
19
23
11
16
9
22
18
4
7
14
17
5
20
8
1
15
10
12
13
21
3